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ABSTRACT

This study compared the effectiveness of three types of telecommunications technology and a traditional face-to-face approach in training day care teachers, aides, and administrators. The technologies were audio telecommunications with (1) audiotapes and slides, (2) videotapes, and (3) slowscan television. Data were collected through observations of training implementation, knowledge pretests and posttests, an opinionnaire, and a demographic survey of trainee characteristics. Results indicated that each training approach could be presented to cover the same content and procedures in similar amounts of time. Each approach resulted in a significant increase in knowledge, and none of the approaches was more effective than others in achieving knowledge gain. Subjects viewed traditional sessions more positively than audio or slowscan television sessions and preferred sessions delivered at a single site to multi-site sessions. Trainees who initially knew the least about the content learned the most. Other trainee characteristics were not related to the amount of learning that occurred. It was concluded that telecommunications technologies can effectively be used for training day care personnel. Additional observations are discussed, and recommendations are offered regarding the implementation of telecommunications training. Specifically, these recommendations concern primary sources of problems and the quality and effectiveness of training. (RH)

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A Summary Report
of

TELECOMMUNICATIONS

Training for Day Care Teachers, Aides, and Administrators: A Comparative Study

Prepared for
The Office of Day Care Services
North Carolina Department of Human Resources

by

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We owe a particular debt of gratitude to the trainees.¹ They provided us with vast amounts of information, without which the study could not have been accomplished.

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INTRODUCTION

To expand day care training at a time when resources for such training are dwindling, the North Carolina Department of Human Resources through its Office of Day Care Services (ODCS) sought and received a federal grant to explore the use of telecommunications technology for training. The grant required ODCS to develop several types of telecommunications training and to determine the efficacy of each technique.

A contract was awarded to the Frank Porter Graham Child Development Center at The University of North Carolina at Chapel Hill to conduct the external evaluation of the selected telecommunications approaches. This report summarizes the findings of the evaluation. The report first describes the training content, the telecommunications technologies that were used, and the logistics of delivering the training to day care teachers, aides, and administrators. Evaluation procedures are then outlined. Finally, the findings and recommendations for potential users of telecommunications for training are presented.

THE TRAINING

Training Content

The targets for the training were two groups of day care personnel: (a) teachers and aides and (b) administrators. The training for day care teachers and aides covered two topics. The first, "Creating a Classroom Environment," was designed to teach trainees how to select and arrange activity centers in a day care classroom. The second topic, "Focus on Families," was designed to acquaint the trainees with characteristics of contemporary families of young children. Two trainers on the ODCS staff led the development of the training, and they were assigned as the trainers for the study. Throughout the study, each trainer presented the topic that she had developed.

The training for the day care administrators presented material regarding the financial management of a day care center and was entitled, "The Questic is of Money." A consultant developed the content for the training. An ODCS staff member who had provided the training for the teachers and aides served as the trainer. A cotrainer assisted the trainer in discussions of the content and in question and answer sessions.

Throughout this paper, these topics will be referred to as "Environment," "Families," and "Money."

Training Procedures

The training was designed to present the content in several ways. A trainer presented information orally. This presentation was supplemented by numerous pictures, illustrations, and, in some instances, audio tapes. Exercises were included to provide the trainees with direct experiences with the content.

Traditional training (TRAD) Sessions were developed to provide standards against which to compare the effectiveness of the telecommunications approaches. For these sessions, the trainer traveled to the remote sites to present the training in person. Presentations by the trainer were supplemented by teaching aides such as audio tapes, slides, and printed materials. A "facilitator" was present at each site to introduce and assist the trainer.

The following three forms of telecommunications were originally selected for comparison with the traditional training.

Audio telecommunications with audio tapes and slides (AUDIO) required the use of telephone lines to connect the trainer and the trainees who were at different locations, by way of an interactive speaker phone. The trainer instructed the trainees (one-way communication) and promoted discussion and

answered questions (two-way communication) via the audio telecommunications equipment. The presentation of the content was supplemented at the training site (the site at which the trainees were gathered) by packets of printed materials and slides. A facilitator was at the training site to organize the session, distribute materials, moderate discussions, assist trainees with the exercises, operate the audio and visual equipment, and keep the trainer informed about what was happening at the training site.

Audio telecommunications with video tape (VIDEO) was identical to the audio training with one major exception. Oral presentation of the content, audio tapes, and/or slides were replaced by a video cassette tape, which was played on a video monitor at the training site. Exercises and discussions were conducted by using an interactive speaker phone at the conclusion of each segment of the video tape. Again, a facilitator was present at the training site to organize the session and to operate equipment.

Audio telecommunications with slowscan (SCAN) was the same as the audio training except that visuals were transmitted to the training site by slowscan. Slowscan teleconferencing allows the transmission of a still image through telephone lines to a television screen at another site. The transmission of a single image takes 36 seconds--hence the name "slowscan." Slides which were similar to those used in the audio training were transmitted as well as figures and diagrams used in exercises. Technicians operated video cameras at both sites so that pictures of the participants, examples, and results of exercises could be transmitted both ways. A facilitator performed the same roles as in the other sessions.

All three types of telecommunications training were used in the training of teachers and aides. Technical problems made it necessary to substitute video for slowscan for the transmission of the training on "Families" to two of the sites. Slowscan was then excluded from analyses of the results for

this topic since there were few participants in the remaining slowscan session. Slowscan was dropped from administrators' training because of the previous transmission problems and high costs.

Training Sites

Training was transmitted from Raleigh to five teleconference centers in Raleigh, New Bern, Greensboro, Charlotte, and Asheville. These centers were selected because they cover the major geographic regions of North Carolina.

Raleigh was designated as the site for pilot-testing both the training and the evaluation instruments and procedures. New Bern and Greensboro were designated as locations for single-site transmission (i.e., telecommunications training was transmitted to New Bern and to Greensboro at different times). Charlotte and Asheville were sites for the testing of transmission of telecommunications training to multiple sites (i.e., telecommunications training was transmitted to Charlotte and Asheville at the same time). For the training of teachers and aides, New Bern was used as a pilot rather than a field test site in order to further refine the training and the evaluation instruments and procedures.

Training Schedule

The training for teachers and aides was conducted in two days scheduled one week apart. On the first day, an orientation and the first topic were presented. The following week the same group of trainees returned for the second topic using the same training approach that they had participated in previously (see Figure 1). For administrators, the orientation and training all occurred on one day. The three pilot sessions for teachers and aides took place in the early summer of 1983. The field tests followed. The two pilot tests and the training for administrators were held in the fall of 1983.

FIGURE 1
Training Schedule for Teachers, Aides, and Administrators

| TRAINEES | DAY 1 ^a | DAY 2 ^a |
|--------------------------|-----------------------------------------|--------------------|
| Teachers and Aides | Orientation Topic 1: Environment | Topic 2: Families |
| Administrators | Orientation Topic: Money | |

^aDay 1 and Day 2 were one week apart.

Trainees

The training was designed to be presented to day care teachers, aides, and administrators who worked in Headstart and/or state-certified day care centers in North Carolina. Representatives of Headstart centers were later dropped from the training sessions for teachers and aides because the sessions were to be held in the summer--a time when most Headstart programs in the state were closed. Headstart personnel were included, however, in the training designed for the administrators.

A total of 370 people attended at least one of the training sessions. The number of people who attended each type of session are described in Table 1.

TABLE 1
Number of Trainees Participating in the Study

| TOPIC | TYPE OF TRAINING | | | |
|-------------|------------------|-------|-------|-------------------|
| | TRAD | AUDIO | VIDEO | SCAN ^a |
| Environment | 37 | 44 | 37 | 38 |
| Families | 35 | 37 | 33 | - |
| Money | 35 | 36 | 38 | - |

^aSlowscan was dropped from analyses of the data on Families and eliminated from the training on Money.

EVALUATION DESIGN AND PROCEDURES

Evaluation Design

There were three primary audiences for the evaluation of the training: the funding agency for the ODCS grant, the Administration for Children, Youth, and Families in the U.S. Department of Health and Human Services; the North Carolina Office of Day Care Services; and other state agencies and organizations interested in the use of telecommunications for training. The information needs of these audiences led to the selection of four questions as guides for the inquiry:

1. Are there differences among the approaches in the way in which they are implemented?
2. Are there differences among the approaches in the amount of knowledge acquired by trainees?
3. Are there differences among the approaches in terms of trainee perceptions and satisfaction?
4. Are there characteristics of trainees that are related to the effectiveness of the telecommunications approaches?

Two types of evaluation were chosen to provide the information that was needed: (a) a process evaluation that would provide information regarding the

implementation of the approaches and (b) a product evaluation that would provide information comparing the outcomes of the training and would identify characteristics of the trainees for whom the training was most successful.

The design for the study was a form of comparative, randomized experiment. The trainees were volunteers from the areas surrounding each training site. Day care centers in which the trainees worked were randomly assigned to one of the training approaches--traditional, audio, video, and slowscan for teachers and aides; traditional, audio, and video for administrators. Controls such as standardization of the training content presented and standardization of the data collection procedures were imposed to limit variation which might confound the results.

Data collection procedures were designed to be objective and consistent across approaches and sites. The evaluators collected and analyzed all the data. They were also responsible for developing the necessary instrumentation.

Instruments were developed, evaluated, and revised during pilot tests. Four types of instruments were constructed: (1) an observation form was prepared for use by the evaluators in recording their observations of the implementation of the training, (2) knowledge tests were developed to determine trainees' knowledge of the content before and after the training; (3) an opinionnaire was developed to gather information on trainees' opinions of and attitude toward the overall training and toward the technology and its use, and (4) a demographic survey was designed to obtain information on characteristics of the centers in which trainees worked and of the trainees themselves.

The evaluation design and the study procedures were synthesized in an evaluation plan which guided the development and implementation of the study (see Figure 2).

FIGURE 2
Plan for the Evaluation of Telecommunications
Training for Day Care Teachers, Aides, and Administrators

| EVALUATION QUESTION | VARIABLE TO BE ASSESSED | INSTRUMENT | DATA COLLECTION PROCEDURE | DATA ANALYSIS PROCEDURE |
|-----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------|-------------------------------------------------------------------------------|-----------------------------------------------------------|
| PROCESS EVALUATION | | | | |
| Are there differences among the approaches in the way in which they are implemented? | (a) Description of the training (b) Aspects which might influence or explain results | Observation Form | Observation by external evaluators at the training site and transmission site | Compilation of Ratings (b) Summary of Observations |
| PRODUCT EVALUATION | | | | |
| 1. Are there differences among the approaches in the amount of knowledge gained by the trainees? | Knowledge acquisition | Knowledge Test | Administration of pre- and posttest to trainees by external evaluator | Analysis of Variance |
| 2. Are there differences among the approaches in terms of trainee perceptions and satisfaction? | Attitude toward and opinion regarding the training | Opinionnaire | Postsession administration only to trainees by external evaluator | (a) Analysis of Variance (b) Summary of Comments |
| 3. Are there characteristics of trainees which are related to the effectiveness of the telecommunications approaches? | (a) Characteristics of the day care center in which the trainee works (b) Characteristics of the trainee | Demographic Survey | Mailed to trainees and brought to training | Correlation |

RESULTS OF THE EVALUATION OF TELECOMMUNICATION TRAINING

This study was designed to determine if there were differences among the telecommunications approaches used to provide training to day care teachers and aides and day care administrators. In combining the results of the study for both groups of trainees, four key findings regarding the use of telecommunications for training became evident.

1. Training can be provided consistently across a variety of telecommunications training approaches.

The way in which the training was presented was found to be consistent across all approaches and types of telecommunications transmission--

particularly with regard to the content and the procedural activities that were used to present the training. Over 98 percent of the planned content was covered in all sessions; in most sessions, all planned procedures were carried out as well (see Table 2).

TABLE 2
Consistency of Content Covered and Procedures Followed

| AREA ASSESSED | TRAD | AUDIO | VIDEO | SCAN |
|--------------------------|------|-------|-------|------|
| <u>Content</u> | | | | |
| Environment | | | | |
| single-site | - | 100 | 100 | 100 |
| multiple-site | - | 100 | 96 | 100 |
| all sites | 98 | 100 | 98 | 100 |
| Families | | | | |
| single-site | - | 100 | 98 | - |
| multiple-site | - | 100 | 100 | - |
| all sites | 98 | 100 | 99 | - |
| Money | | | | |
| single-site | - | 100 | 97 | - |
| multiple-site | - | 100 | 100 | - |
| all sites | 100 | 100 | 99 | - |
| <u>Procedures</u> | | | | |
| Environment | | | | |
| single-site | - | 44 | 100 | - |
| multiple-site | - | 100 | 100 | - |
| all sites | 92 | 72 | 100 | - |
| Families | | | | |
| single-site | - | 100 | 100 | - |
| multiple-site | - | 100 | 100 | - |
| all sites | 100 | 100 | 100 | - |
| Money | | | | |
| single-site | - | 100 | 100 | - |
| multiple-site | - | 100 | 100 | - |
| all sites | 100 | 100 | 100 | - |

While the amount of training time varied from one session to another, the only consistent trend was for telecommunications training using video tape with interactive audio to take slightly more time when transmitted to multiple sites than for training transmitted to single sites. Given that these differences in time were 15 minutes or less, it would seem that training using the telecommunications approaches in this study can be conducted in equivalent amounts of time (see Table 3).

TABLE 3
Average Time Required for the Training

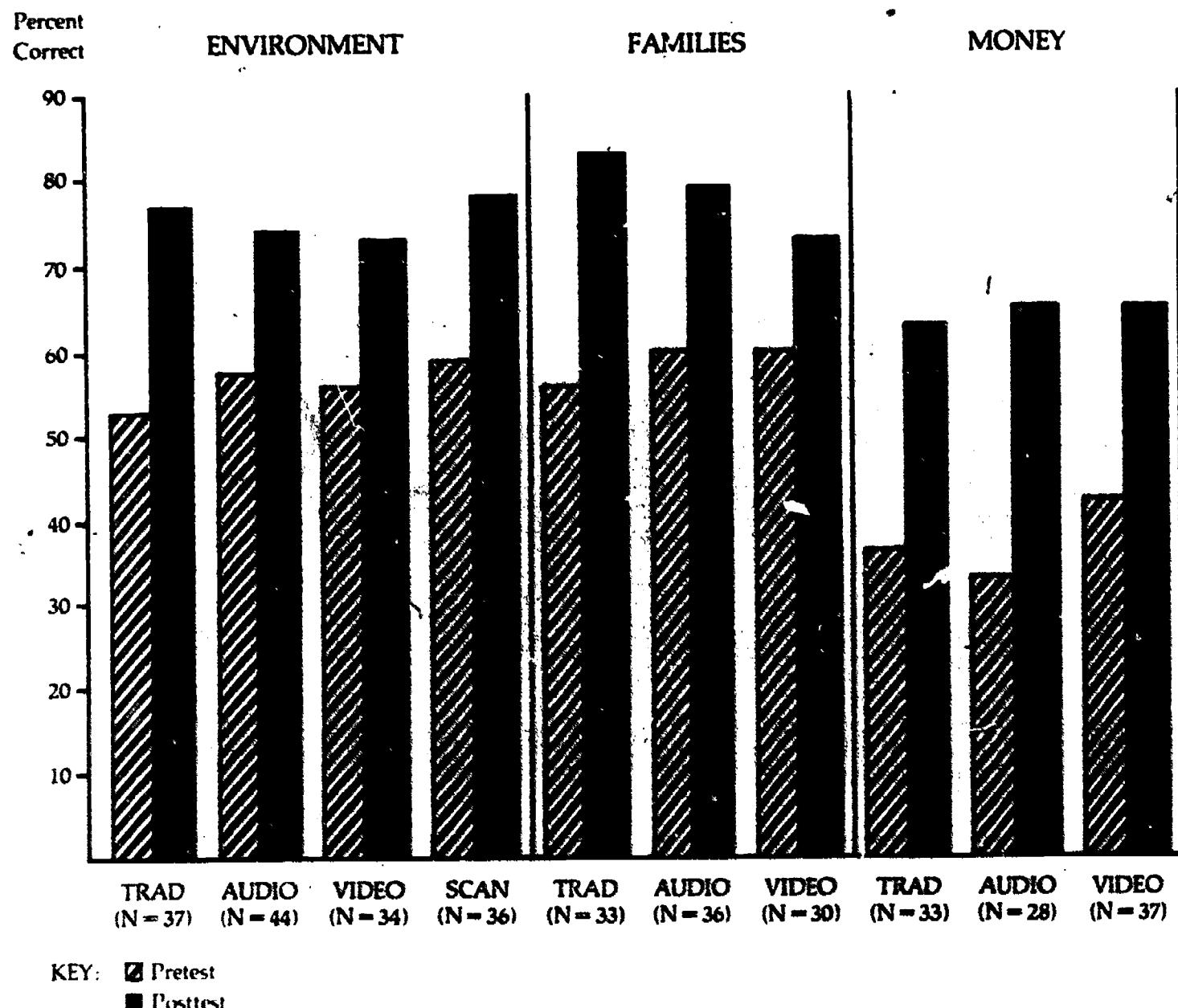
| TOPIC | TRAD Hrs.:Min. | AUDIO Hrs.:Min. | VIDEO Hrs.:Min. | SCAN Hrs.:Min. |
|--------------------|-------------------|--------------------|--------------------|-------------------|
| Environment | | | | |
| single-site | - | 3:00 | 2:21 | 2:52 |
| multiple-site | - | 2:58 | 2:45 | 2:47 |
| all sites | 2:43 | 3:02 | 2:34 | 2:51 |
| Families | | | | |
| single-site | - | 3:09 | 3:09 | - |
| multiple-site | - | 3:19 | 3:20 | - |
| all sites | 3:14 | 3:14 | 3:15 | - |
| Money | | | | |
| single-site | - | 2:22 | 2:07 | - |
| multiple-site | - | 2:24 | 2:23 | - |
| all sites | 2:20 | 2:22 | 2:14 | - |

2. Training using telecommunications technology can effectively be used to increase the knowledge of day care teachers, aides, and administrators.

The results of this study indicated that significant gains in knowledge were experienced by the trainees in all of the types of training used; however, there were no significant differences in knowledge acquisition among the various types of training themselves (see Figure 3). Further analyses

indicated that there were no significant differences in acquired knowledge when telecommunications training was delivered only to one site or to two sites.

FIGURE 3
Percentage of Correct Responses on Knowledge Pretests and Posttests



KEY: Pretest
 Posttest

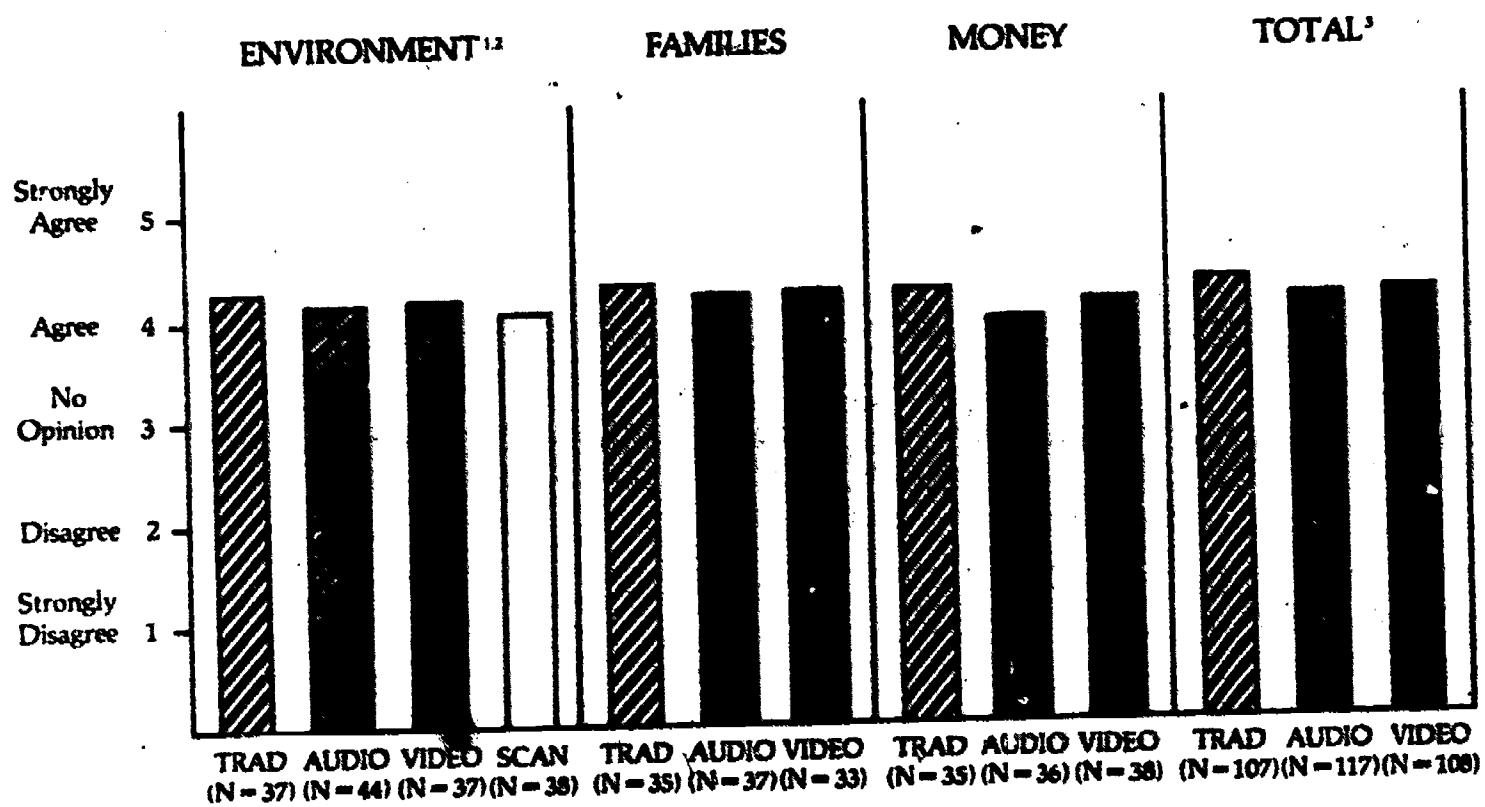
Trainers, therefore, may select from the types of telecommunications training used in this study (i.e., audio, video, and slowscan) and anticipate that increases in knowledge may occur if the training is conducted properly.

3. The trainees who participated in this study rated traditional and video training sessions more positively than audio and slowscan

sessions. In addition, they rated telecommunications training sessions delivered to a single site more positively than those transmitted simultaneously to multiple sites.

Analyses of the trainees' perceptions of the overall training indicated mixed results, but traditional and video training were consistently viewed more positively than audio or slowscan training (see Figure 4). When ratings of the technological aspects of the telecommunications training sessions were compared for each topic and for all topics combined, however, there were no significant differences among the various types of telecommunications used in this study (see Figure 5).

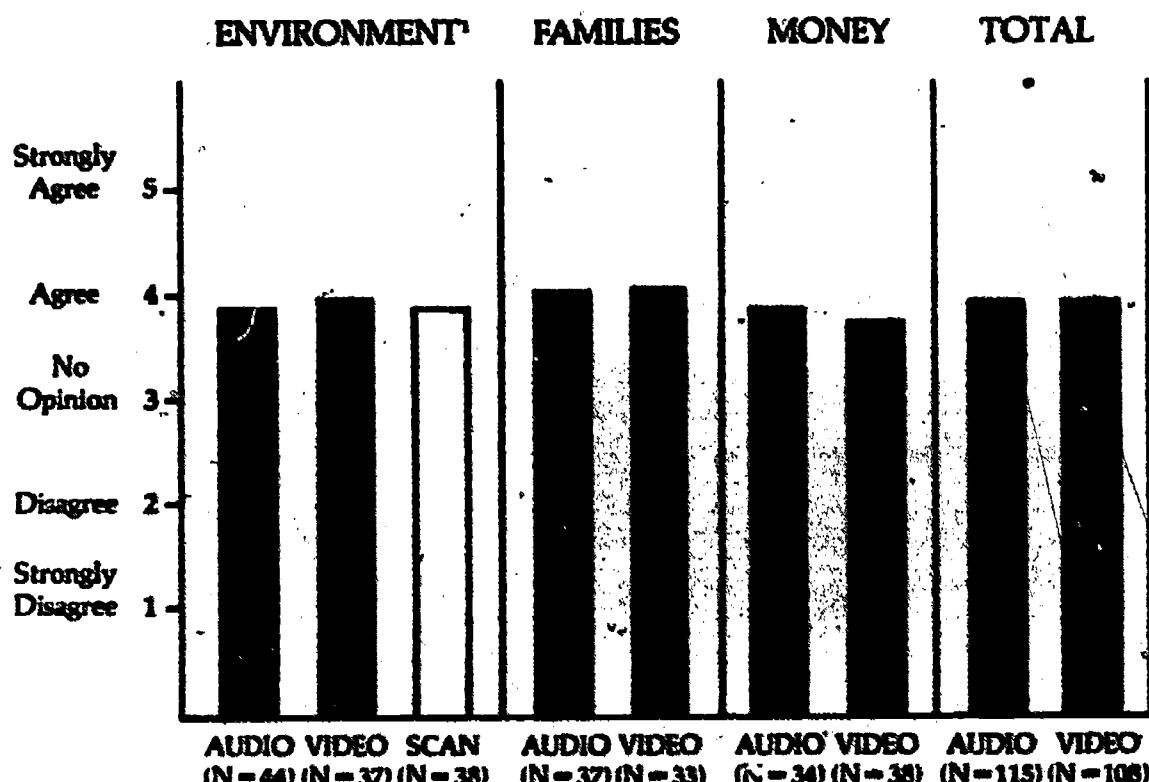
FIGURE 4
Trainee Satisfaction with Overall Training
(Average Likert Ratings)



Key:

- TRAD
- AUDIO
- VIDEO
- SCAN

FIGURE 5
Trainee Satisfaction with Telecommunications Technology
(Average Likert Ratings)



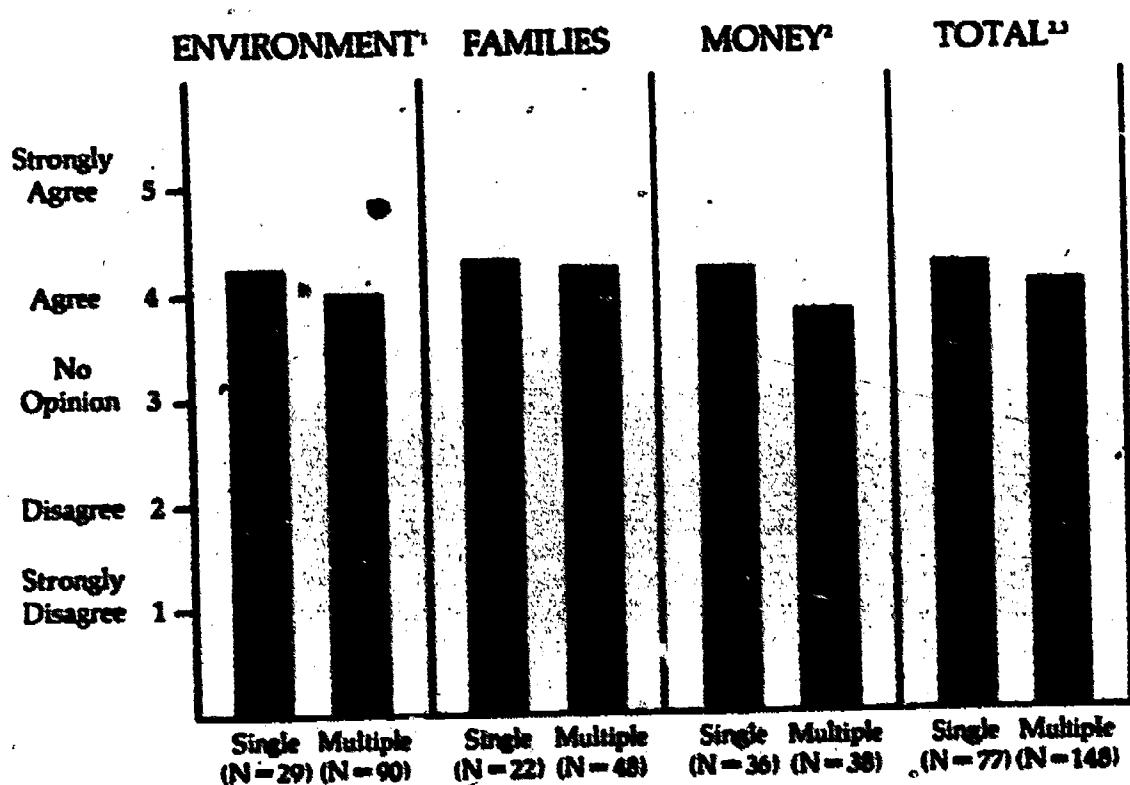
Key:

*Environment was the only topic presented using SCAN.

- AUDIO
- VIDEO
- SCAN

Telecommunications training transmitted to a single site was compared to the training sessions simultaneously transmitted to two sites (see Figure 6). Training transmitted to a single site was rated more positively by the trainees. This finding was true for ratings of both the overall training and the technological aspects of the telecommunications training sessions. The differences were significant for the training of administrators and for the combined data for all trainees.

FIGURE 6
Trainee Satisfaction with Overall Training
for Single- and Multiple-Site Transmissions
(Average Likert Ratings)



*Environment was the only topic presented using SCAN.

**The ratings for those attending single-site transmissions were statistically significantly higher than those for trainees attending sessions in which training was transmitted to multiple sites.

**Ratings from the SCAN sessions on Environment were excluded from this analysis.

Key:

- Single
- Multiple

When specific comments were analyzed to determine why traditional training was often favored, it was found that trainees were uncomfortable talking to a "box." They wanted the trainer present in the room or, at least, pictures or video tapes of her so that they could associate her voice with an image. While preferences for the more familiar traditional training will probably be noted in many training situations in which telecommunications technology is used for the first time, it would seem that focusing on humanizing telecommunications training would improve trainees' attitudes toward technological approaches.

Trainees were less positive about sessions that were transmitted to multiple sites than those transmitted to single sites. This appeared to be due to equipment problems and the slowed pace required to accommodate input from participants at two sites. The equipment problems found in this study (e.g., the leaking of sounds from one site to another) appear to be ones that can be solved by modifications in the way in which the telecommunications equipment is operated and/or by improving the quality of the equipment. The problem of trainee discomfort with the slower pace, however, suggests that the manner of presentation of the training should be modified when additional sites are included. Training and discussion strategies need to be developed that will enhance trainee participation, but, at the same time, maintain a comfortable rate of delivery of content and exchange of ideas.

4. Specific demographic characteristics of the trainees do not seem to be related to the amount of learning that takes place. Instead, trainees who learn the most are those who are least familiar with the content.

Analyses of knowledge gained in relation to pretest scores on the knowledge test indicated that the two were significantly related. Trainees who knew the least about the content area before attending the training learned the most.

Demographic characteristics of those trainees who gained the most knowledge as a result of the training were compared to the characteristics of the remainder of the trainees. While there was some variation between the two groups, none of the comparisons appeared to be strong enough to identify additional characteristics that should be considered in the selection of trainees for telecommunications training. Therefore, trainees selected should be ones who do not know the content and who would benefit from additional knowledge in that area.

Other Observations on the Use of Telecommunications Training

As we reviewed the evaluators' observations and the comments of the trainees, we found that the instruments used to quantitatively assess trainee accomplishments, attitudes, and characteristics did not measure all of the differences that the evaluators and the trainees described. From the reviews and qualitative analyses of observations and comments, three major observations regarding the implementation of telecommunications training emerged.

1. The function and use of the equipment was the primary source of problems in telecommunications training.

In general, the likelihood of problems increased as the amount and complexity of the equipment required increased. This was particularly evident when single- and multiple-site transmissions were compared. Complications associated with the equipment were most often noted in regard to the speaker phones which did not pick up normal voice tones and often produced an unclear sound. During telecommunications sessions, any adjustments required in the equipment or telephone connections were even more disruptive when those assisting in the training were unfamiliar with proper operation of the equipment.

The problems encountered during telecommunications training in this study could possibly be prevented by purchasing high-quality equipment and by instructing all personnel assisting in the training in the effective and proper use and operation of the equipment.

2. The quality of the training was directly affected by the extent to which assistants to the trainer (i.e., facilitators, cotrainers, or technicians) knew what was to be presented and understood their roles and responsibilities in delivering the training.

Assistants to the trainer appeared to have four key responsibilities which varied in intensity depending on the assistant's function in the training and the specific content area: (a) to set the stage for the training and to monitor its implementation, (b) to assist in the presentation of the content, (c) to operate or monitor the telecommunications and other equipment, and (d) to keep the trainer informed of the status of the trainees with regard to the training. These were crucial functions which, when done well, allowed the training to flow smoothly and to be more effective. When one or more of these functions were not handled well, the training was either interrupted or less effective. It would appear, then, that telecommunications training can be enhanced by using assistants who know the purposes for the training and know how it is to be delivered. They should also be very familiar with the telecommunications equipment that is being used so that they can solve the common problems that occur with such equipment. Finally, on-site assistants are the eyes of the trainer. They need to be sensitive to trainee needs, and they should report these needs to the trainer. With this knowledge, the trainer may be able to be more personable and more responsive to the trainees.

3. The extent to which the telecommunications training session and its presentation had been carefully planned affected both the training session itself and the attitudes of the trainees.

Several findings support the premise that good telecommunications training is well-planned in advance and that this planning is necessary for both the presentation of the content and the use of telecommunications

technology. With regard to the presentation of the content, pilot testing of the training resulted in consistent presentations of the content and procedures for presentation. Trainees described the trainers' knowledge of the content and their enthusiasm and personableness in presenting the content as the most positive aspects of the training. Trainees liked the topics that were selected for the training and believed that the information presented would be useful to them. The examples given in the visuals, particularly the video tapes, were praised.

In addition to noting strengths, trainees suggested that planners of telecommunications training: (a) prepare trainees in advance for both the content and technology, (b) maintain a suitable pace during the sessions--particularly in multi-site transmissions where there are more trainees and where activities, such as introductions and repetitions of information take large blocks of time, (c) monitor the visuals so that they are synchronized with the subject matter being presented, and (d) ensure that the facilities are appropriate and comfortable for the training.

Additional planning and preparation are needed when telecommunications technology is used. In the training described in this study, scripts were prepared so that those who presented and assisted in the training would know when activities, including use of the technology, were to occur. When the scripts were available and used at the training site, the training flowed well.

Trainee responsiveness is not as forthcoming in telecommunications training as it is in on-site, face-to-face training. Therefore, strategies to enhance trainee participation need to be included. Different or modified strategies may be necessary when the trainee group size is large, or when training is provided to multiple sites. As mentioned before, strategies to humanize the training should be planned. Finally, it is important that all

persons who provide or assist in the training be trained themselves in both the content and the telecommunications technology being used.

SUMMARY

In summary, telecommunications training may be provided to day care teachers, aides, and administrators without sacrificing learning. In general, those trainees who learn the most are those who are not familiar with the content. While effective learning may take place, it should be noted that many trainees prefer traditional training or aspects of traditional training that may be missing in telecommunications training. The auditory and visual quality of the equipment influences the training. Most of the potential problems that are associated with telecommunications equipment can be solved by using high-quality equipment and by carefully training all of the people who will be using it. This study demonstrated the critical roles of the assistants to the trainer. If assistants know the training, the equipment, and the role they are to play, they can substantially enhance the quality and effectiveness of the training. Finally, the training itself and the use of telecommunications in the training need to be well-planned and well-executed.

The study as a whole demonstrates that telecommunications technology can be used effectively for training. It is a valuable tool for state agencies to use in updating and upgrading the knowledge and skills of those who provide services to children and families.

ADDITIONAL INFORMATION

More information about the evaluation design and methodology may be found in the complete technical report, Telecommunications Training for Day Care Teachers, Aides, and Administrators: A Comparative Study, which may be purchased from the Frank Porter Graham Child Development Center, 500 NCNB Plaza, Chapel Hill, North Carolina 27514. Additional information regarding the training and the telecommunications technology may be obtained by writing the Office of Day Care Services, N.C. Department of Human Resources, Albemarle Building, 325 N. Salisbury Street, Raleigh, North Carolina 27611.